VISIT…

1

83-Move Box

Puzzle Goal: **The goal of the puzzle is to open the box.**

Materials: Walnut, Birch, Wenge, Maple

Classification: Take-apart

Notes: The aesthetics of the box reach beyond your average box. In reality it is a 3-D representation of a maze. To solve the box one must successfully find their way through a maze of movements. A careful examination of the movements will reveal that the path traveling around the box is a key to the solution. The sequence of movements is always unlocking new panels to slide. This continues until the lid is unlocked and slides free. The path around the box maps the sequence of panels that are unlocked in order. If you pay close attention you should always know what panel to move next. However, you will also have to back track often. There is reason it takes 83 moves! I consider it to be a very difficult puzzle.

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2 Akropolis

Puzzle Goal: **Help the ancient Greek people to restore the famous temple on the Akropolis.**

Put the pegs in the pieces and slide them so that they match with the 3 plates; place the extra slide and peg in the empty space, then add the roof.

Materials: Wood

Classification: Sequential movement

Notes: There are only 2 solution configurations for the given problem . If the extra placeholder is not used, then there are 6 solutions.

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3

Apple

Puzzle Goal: **PUZZLE 1: To release the coin trapped between the two halves of the Apple.**

PUZZLE 2: To release the coin in the bottom half of the Apple.

PUZZLE 3: To release the coin in the top half of the Apple.

Materials: African blackwood, sterling silver

Classification: Take-apart

Notes:

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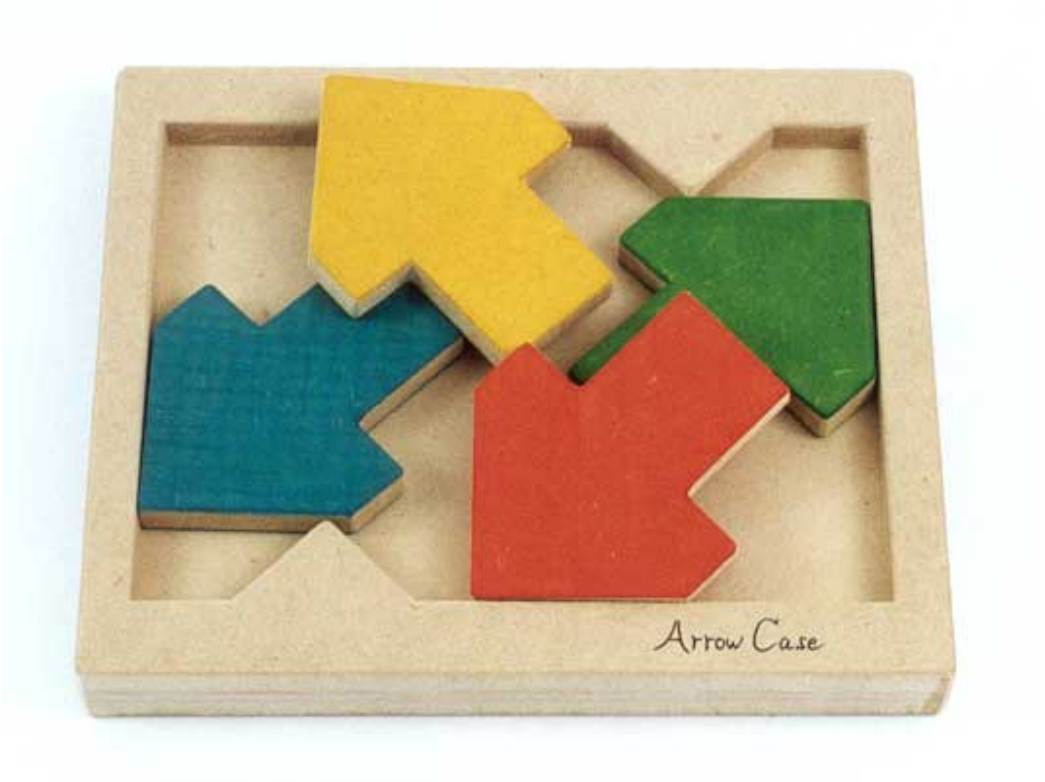
4 Arrow Case

Puzzle Goal: **Place four arrows flat in frame.**

Materials: MDF board

Classification: Put-together

Notes: Both sides of frames are puzzle stages.



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5 Interlocking Puzzle 2

Puzzle Goal: **Take apart 4 wooden pieces out of bottle. Then get back!**

Materials: Glass bottle and Agathis wood

Classification: Take-apart puzzle (not impossible object)

Notes:

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6 Burr in Cube #1

Puzzle Goal: **The problem is to assemble the 6 piece burr inside the cage.**

Materials: Wood (Walnut, Ash)

Classification: Interlocking Burr

Notes: If we look at regular 6-piece burrs, it can be easily seen that they can be enclosed in a cube. I was interested in the question “What is the highest level of a six-piece burr puzzle which has a unique solution outside the cube and can also be assembled inside the cube?”. Unfortunately for notchable burrs the answer is none. However, there are a few notchable burrs which are level 4 and unique when assembled inside a cube, but they are of lower level and not unique when assembled outside.

Burr in a Cube is the level 4 notchable six-piece burr with the least number of internal voids.

For regular pieces the question has not yet been answered.

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7

Cassiopeia

Puzzle Goal: **Open the secret compartment.**

Materials: Wenge, cherry tree

Classification: Take-apart

Notes: Keep away from magnetic fields.

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8

Color Wheel

Puzzle Goal: **Stack the nine disks such that the full twelve-segment color wheel is visible when the puzzle is held up to the light (red,red-violet,violet,blue-violet,blue,blue-green,green,yellow-green,yellow,yellow-orange,orange,red-orange).**

Materials: Acrylic

Classification: Put-together; 2-D assembly

Notes: The nine pieces comprise a complete mathematical set, with one slight modification. Divide a circle into six equal wedges. Color two of those wedges with two different primary colors. Not counting flips and rotations, there are nine different ways to do this. These pieces can not be assembled to form the color wheel, as described above. Modifying one piece renders the puzzle solvable. In this puzzle, the piece which would consist of the blue and yellow wedges separated by 60 degrees has been modified so that those two wedges are 90 degrees apart.

For aesthetic purposes, the wedges have been blurred along their edges, with the blur extending into the adjacent wedge. This facilitates blending and makes the final color wheel smoother. It also compensates for inevitable registration problems.

Note that while the primary colors are red, yellow, and blue, the artwork for this puzzle was done with process colors, so the primary colors are magenta, yellow, and cyan.

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9

Concubation

Puzzle Goal: **The goal is to disassemble the puzzle and reassemble it into a non-coordinate-motion form or into the original coordinate-motion configuration. An additional goal is to put a little (half-size) cube inside.**

Materials: White Ash or Rosewood

Classification: Interlocking solid, with some dexterity

Notes:

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10 Cryptic Crosses

Puzzle Goal: **Take the eight pieces and put them together to make 4 crosses. There are 2 different and distinct ways to do my puzzle.**

1 When the crosses are made all the numbers must face each other.

2 When the crosses are made no numbers face each other .

After the four crosses are made, the goal is to stack them up so that 4 different symbols appear in each of the eight columns.

Materials: Beech Plywood

Classification: Put together

Notes: There are 105 problems when the numbers are together and a further 105 problems when the numbers are apart. Some of the permutations have zero solutions, some have 1 solution and others have two solutions. The objective is to find all solutions. Start by trying the following type-1 problem with 2 solutions: 1-2, 3-6, 4-5, 7-8.

Since this was to be my exchange puzzle for IPP 21 and the gathering is happening in Tokyo I decided it would be nice to have Japanese symbols instead of colours. I chose words for Peace, Benevolence, Health, Happiness and Wisdom to be my symbols.

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11 Cubic Sound

Puzzle Goal: **It is a 5x5x5 cube There is a small bell in the central cubic cell. Take it out, and put the pieces back to form the 5x5x5 cube.**

Materials: Wood

Classification: Interlocking solid

Notes:

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12 Diamond Burr

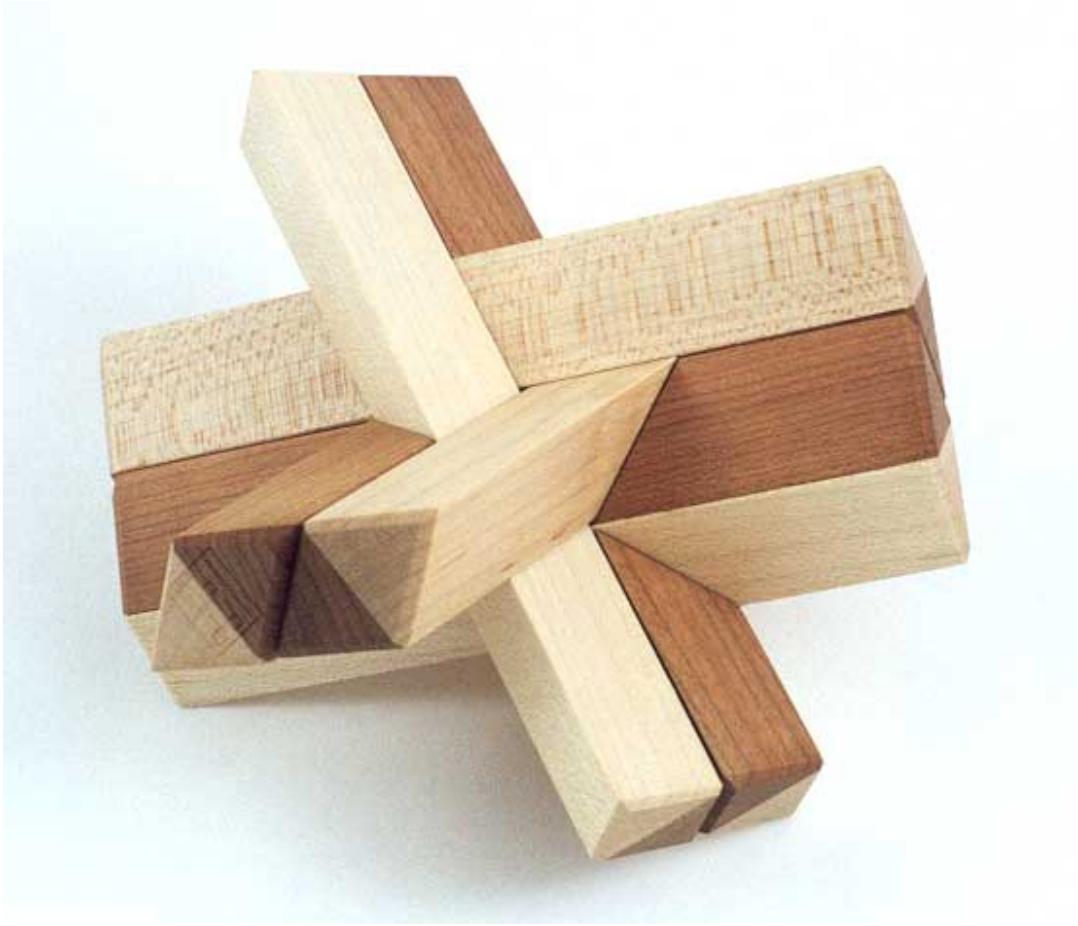
Puzzle Goal: **Taking the puzzle apart is easy - reassembling it is a bit harder**

Materials: Wood (Maple, Cherry)

Classification: Interlocking Burr

Notes: The idea came out of gluing together a large number of cut-offs from making the traditional six-piece diagonal burrs. At some point it became clear that this would lead to the possibility of a squashed diagonal six-piece burr.

The puzzle itself then was made out of triangular stock in two different woods to give it a little bit of accent.



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13 Domino Puzzle Ring

Puzzle Goal: **The objective is to put the pieces together in a certain order so that the pieces fit together into a ring.**

Materials: Silver plated brass, 1.35 mm garnets

Classification: Put-together

Notes:

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14 The Donkey's Tail

Puzzle Goal: **The goal of this box is to open the hidden drawer using only your ingenuity, the box itself and parts thereof.**

Materials: Hardwood, brass, springs, magnets, stainless steel, woolen fabric.

Classification: Take-apart

Notes: Inspired by the antique "British Writing Slope", this secret opening box utilizes a concept first introduced to me via one of the many secret opening devices employed in Jerry Slocum's portable desk/safe. My puzzle box ‘does homage’ to this concept in an originally designed implementation.

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Dream of Zebra

Puzzle Goal: **Open the secret compartment.**

Materials: Walnut, etc.

Classification: Take-apart

Notes:

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16 Evil Raft 5x

Puzzle Goal: **Build a raft with the ten logs, with five logs places side-by-side horizontally face-up, interlocking with the other five logs place side-by-side vertically face-down.**

Materials: Wood

Classification: 3D Interlocking

Notes: This variation of the original Raft 5 is also an interlocking mesh of log-shaped pieces. But while the original was a strictly complete of set of all pieces defined by one notch and one dovetail, this one violates all the rules with extra dovetails, hidden voids and parts that require careful positioning of the other parts before assembly can continue.

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17 Extreme Boxed Burr

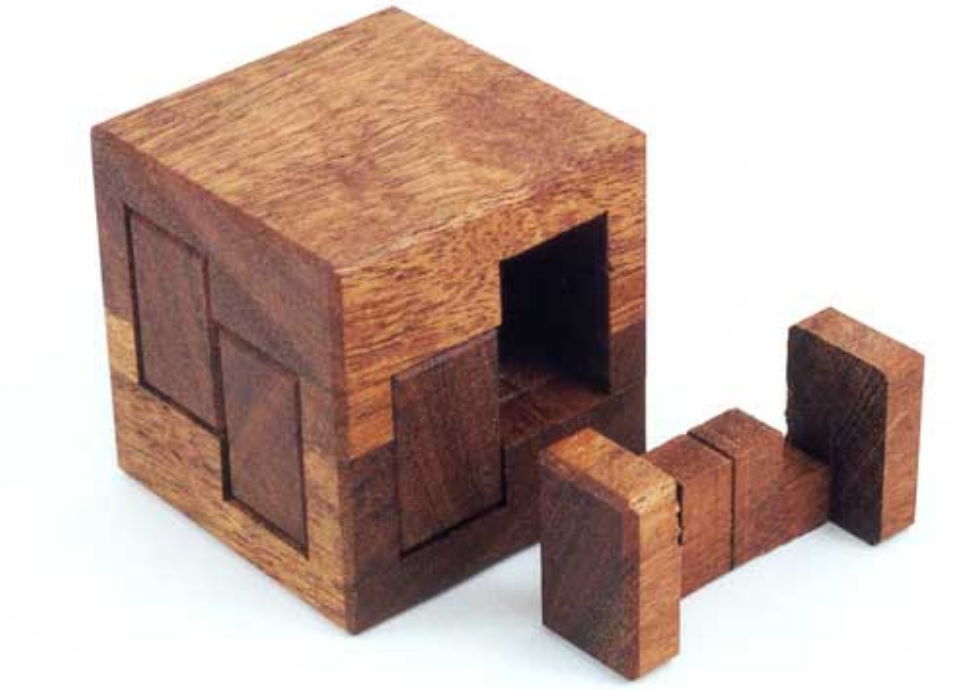
Puzzle Goal: **Get all four pieces into the box.**

Materials: Mahogany

Classification: Boxed burr

Notes: Some people like extreme sports, some like extreme puzzles. This puzzle is the result of a search for a difficult puzzle with only very few pieces. It consists of only four, deceptively simple, notchable pieces; but nevertheless it is a surprisingly difficult puzzle, having a unique level 23 solution.

The puzzle can either be presented assembled, or disassembled.



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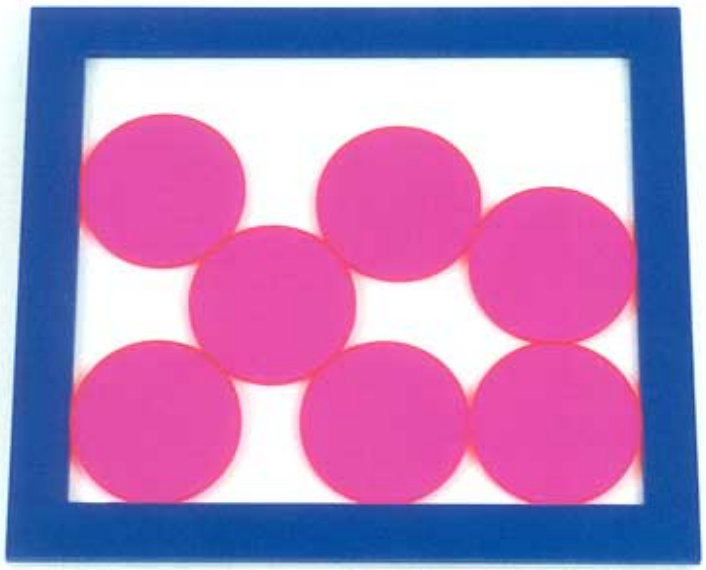
18 Freeze the Coins

Puzzle Goal: **Arrange the 7 coins so that they do not slide in any direction.**

Materials: Plastic

Classification: 2D assembly

Notes:



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19

Gift from Sun

Puzzle Goal: **This fish is a horse mackerel. Please open it, like you would open a real fish to eat.**

Materials: Verch, walnut, etc.

Classification: Take-apart

Notes:

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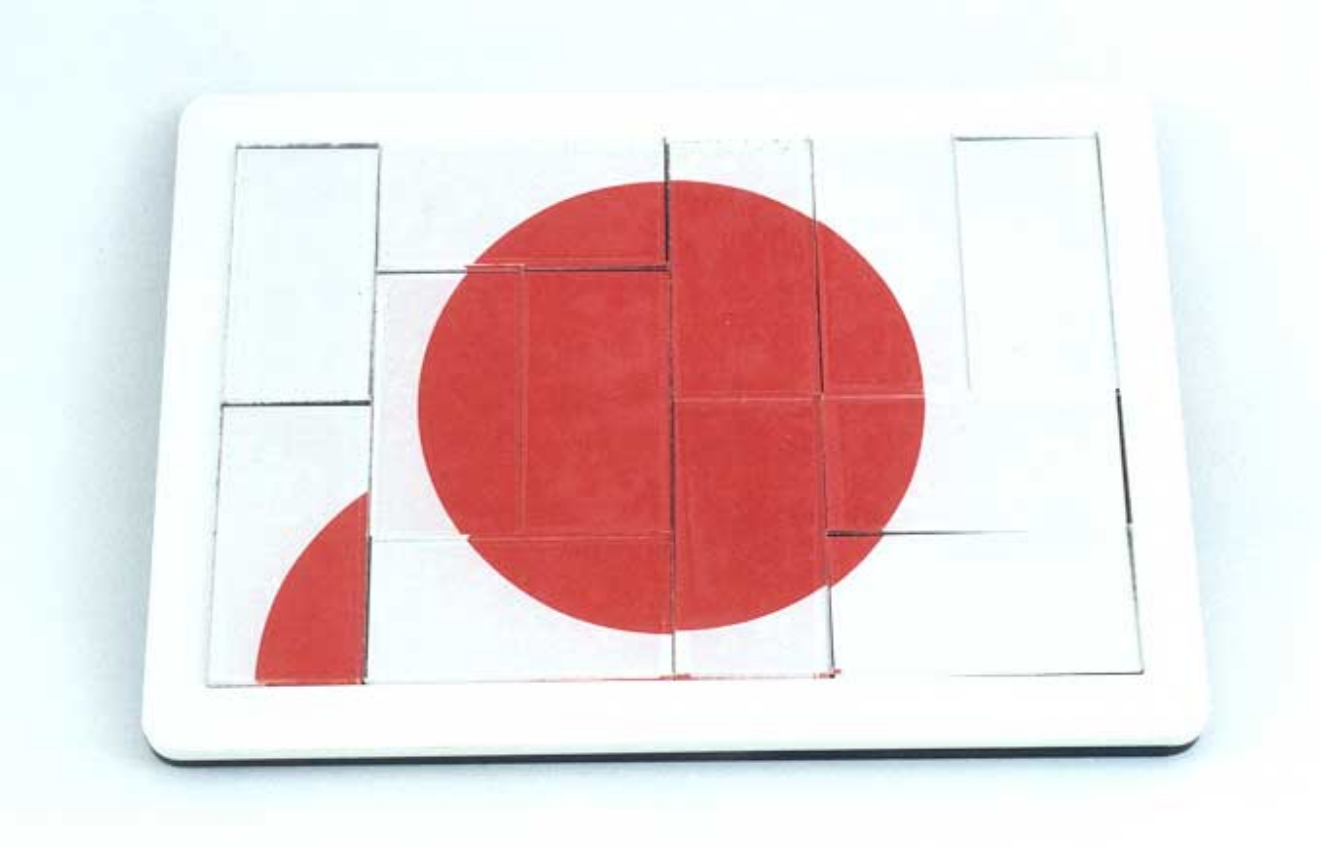
20 Hinomaru/Japanese Flag Puzzle

Puzzle Goal: **The goal is to put the pieces into the tray such that the patterns on the face-up sides form a picture of Hinomaru, the Japanese national flag (i.e., a large, solid, red disk in the middle of a white field)*. The picture that results on the face-down sides of the pieces is irrelevant.**

Materials: Plastic and paper

Classification: 2-D Put Together

Notes:



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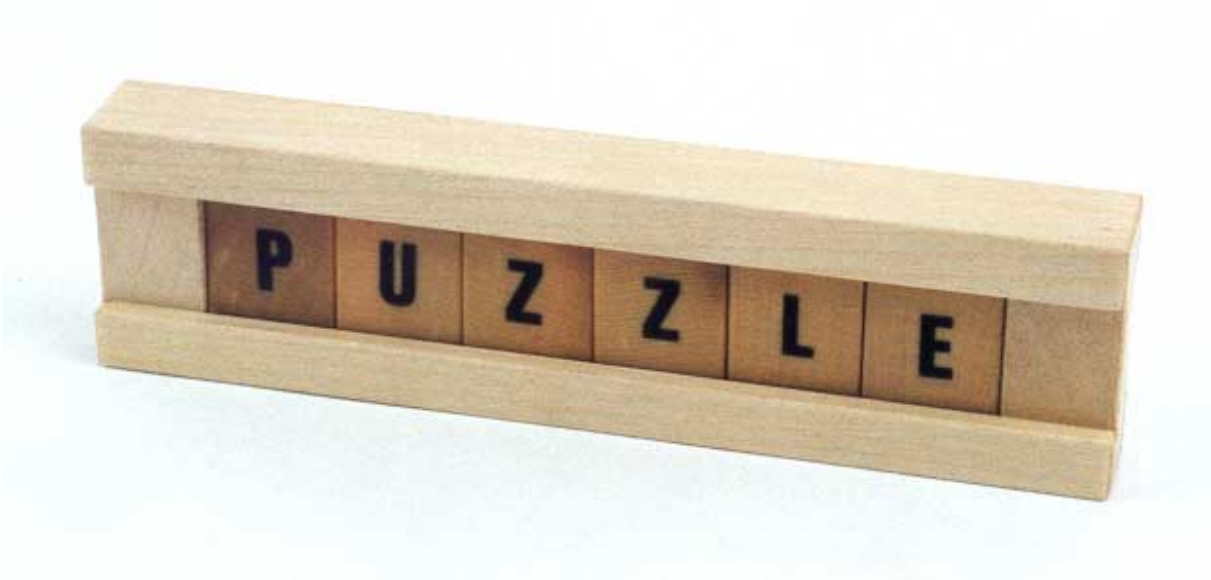
21 IPP Sliding Piece Puzzle

Puzzle Goal: **Arrange the letters and numbers by sliding them around to read from top to bottom "PUZZLE" on one side and " 2001 " on the other (at the same time). Then change them to "PARTY " and "TOKYO ".**

Materials: Sycamore

Classification: Sliding block

Notes: A similar game was invented by Arthur L.Smith and published in July 1940 (SPRING, SUMMER, AUTUMN, WINTER) and a number of similar puzzles, mainly with names and birth dates, have been produced recently.



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22

Kites and Bricks

Puzzle Goal: **Pack 10 small kites, 5 large kites, and 7 dominoes in a 7x7 square.**

Materials: Walnut

Classification: Put-Together, 2D Assembly

Notes: I've long wanted a puzzle that would be easy for a human, but hard for a computer. Kites and Bricks fits into this category. It has the highest satisfaction/effort ratio of any puzzle I've tried.

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23 Lucy and Bob's Barbeque Bash

Puzzle Goal: **Lucy and Bob are having a backyard cook-out, and they need to build a barbeque pit. Ue the 4 bricks to build two different barbeque pits:**

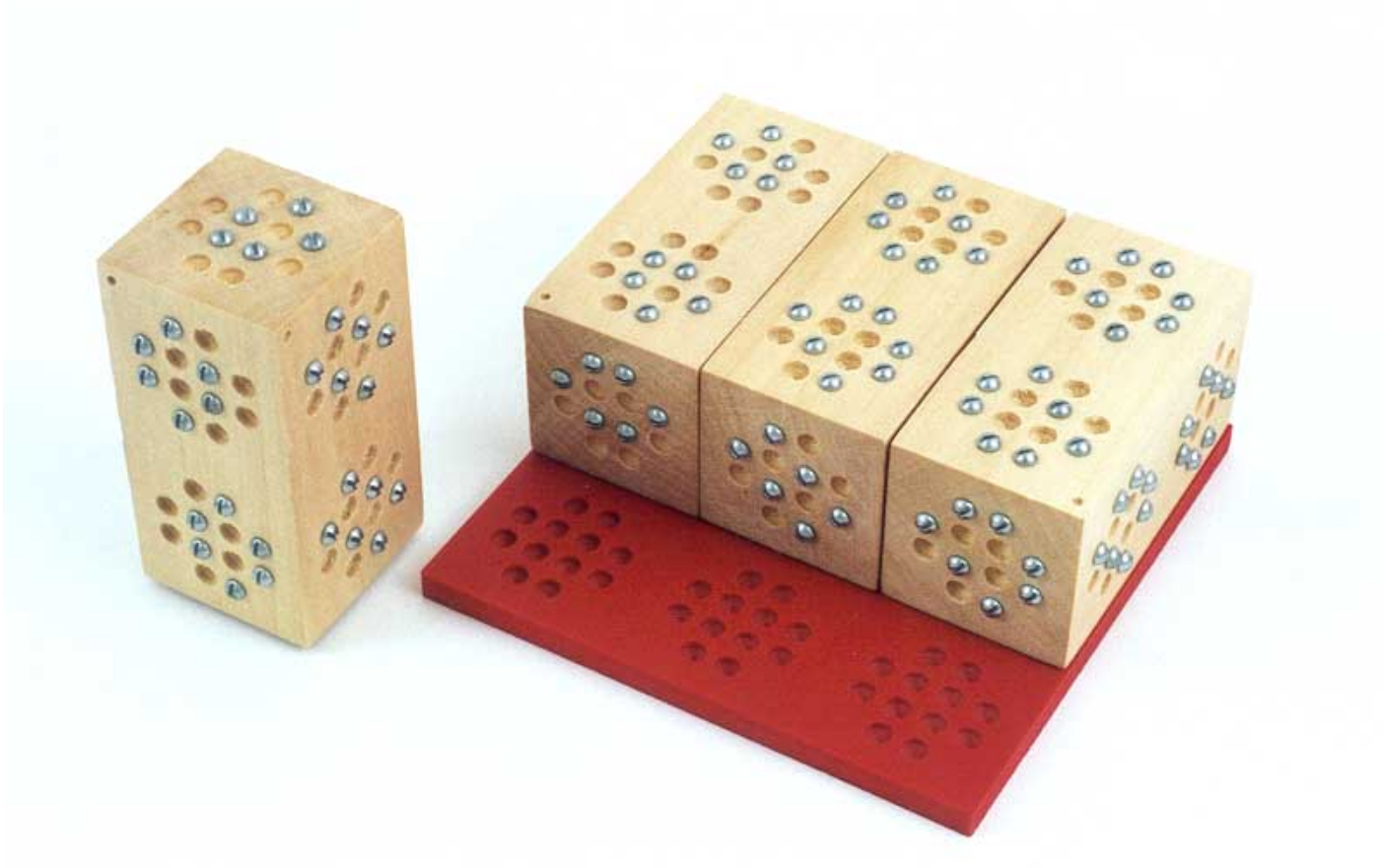
1: Lucy wants to build a closed barbeque pit and cook on top (2x2x2 cube).

2: Bob wants to build an open barbeque pit and cook in the center (3x3x1 ring).

Materials: Four small wooden cubes, one square sheet of plastic, and 240 screws.

Classification: Put Together

Notes:



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24 Molecule Puzzle

Puzzle Goal: **The object of this puzzle is first to disassemble the 24 puzzle pieces and then reassemble the puzzle returning it to its original form. The puzzle may be solved multiple ways creating several different colorful combinations for display. Once solved the puzzle can be disassembled and solved again to obtain a different combination of contrasting or solid colors.**

Materials: Colored PVC type plastic

Classification: Interlocking

Notes: My motivation for creating this puzzle was to create a puzzle that used symmetrical pieces that could be intersected interchangeably in any one of three X, Y, or Z axis. Being an avid puzzle enthusiast and puzzle collector since a very young age, I found the challenge of working with symmetry across three axis to be a fun and challenging puzzle. The use of circles was chosen because so many current puzzles in my collection are based on the use of squares or cubes. Due to the symmetrical nature of the puzzle, it will also spin like a top once any side is balanced on a flat surface and the puzzle is spun like a top.

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25

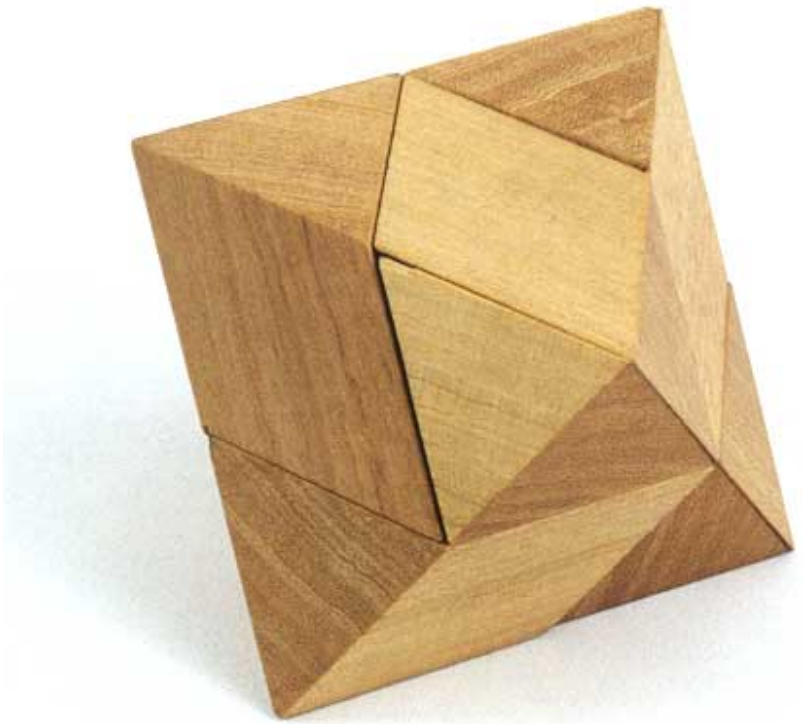
Octo 1

Puzzle Goal: **Assemble the pieces into an octahedron.**

Materials: Wood

Classification: 3D assembly

Notes: This unimposing Octahedron is more difficult than it looks. While designed long ago, these pieces have never before been seen. I had a great deal of trouble getting the seemingly simple pieces made. Off and on I would attempt to have this design made by someone, anyone. Finally, I was able to obtain basic components made. With these components, a prototype was built. Now in its Polydron box, it makes its international debut. Treat it kindly, it's come a long way.



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26 One Piece Packing Puzzle

Puzzle Goal: **Place the cube in box so that it stays inside.**

Materials: Mahogany box; walnut veneer cube with Neodynium magnets

Classification: Put-together

Notes: The design is simple and is based on two basic properties of magnets.

Opposing magnets repel each other more the closer they get. However as they get close any slight misalignment will cause them to move sideways. In the "correct orientation" the magnets are misaligned because the magnet in the face of the cube is slightly off centre. The magnet in the face of the cube cannot move but the magnet in the base of the box is forced to one side in its groove against the compression spring.

If opposing magnet are moved sideways, they weakly attract each other. This means that in the “correct orientation” the magnet is weakly held into the box, once the magnet in the base has been forced to one side.

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27

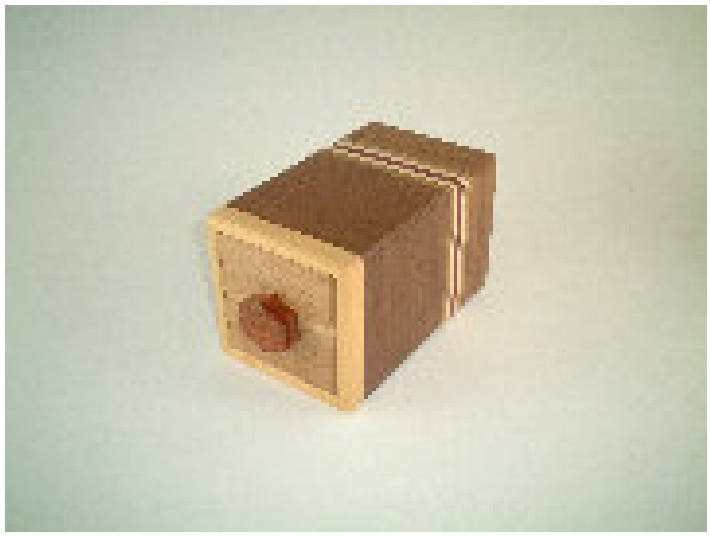
Openable Box

Puzzle Goal: **You can pull and open the drawer. Next, close and change the direction: put a side or bottom face on the top. Now, you can also open it as a usual drawer in same way, even though you changed the direction.**

Materials: Walnut, etc.

Classification: Take-apart

Notes:



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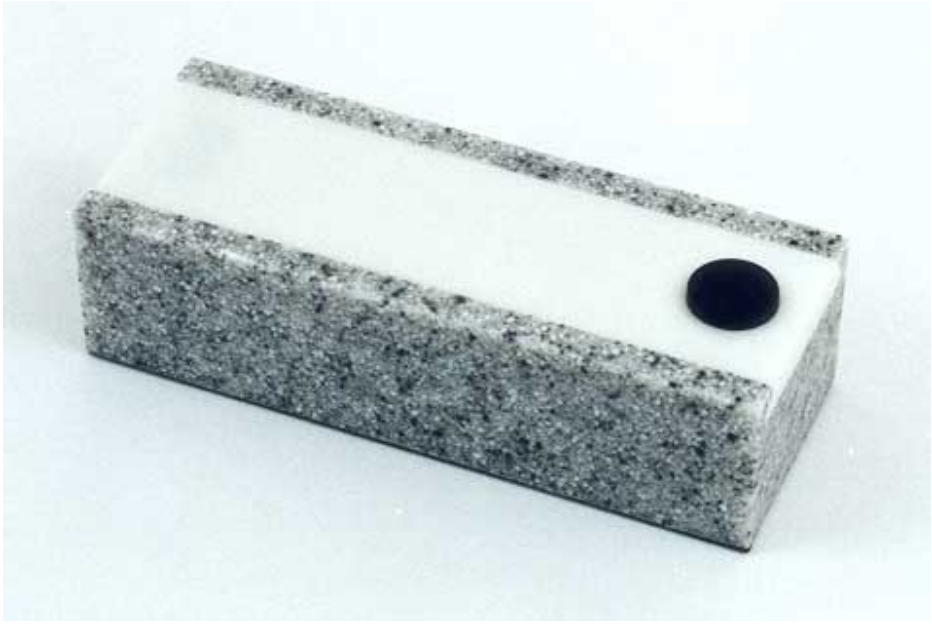
28 Oriental Toothpick Safe

Puzzle Goal: **The puzzle is to open the box. No tools or force is required; rapping is not necessary.**

Materials: Velstone, a plastic (polyester resin)

Classification: Take-apart

Notes:



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29 Outline Burr

Puzzle Goal: **Take the puzzle apart and try to reassemble. It is not as easy as a level 5 puzzle would lead you to expect.**

Materials: Wood (Maple, Cherry, Honduras Mahagony, Redheart keys)

Classification: Interlocking Burr

Notes: The idea was to build a six-piece burr where the pieces where not solid 2*2*6 but a more filigreed version of pieces just using a partial 'outline' of a piece.

To achieve an outline, a 3*3*6 piece construction was used. This leads to a total of 13 possible pieces when no outside holes are permitted. Two of the pieces are not interesting however since they do not offer much interlock. This leaves only 11 usable pieces.

Calculations, starting with the heaviest pieces, have shown that the puzzle using pieces #2 & #3 (three each), has a unique solution of level 5. This is called the 'symmetrical one'.

The highest level Outline Burr is a level 15.4 consisting of the pieces #4,4,5,5,5,8 is called the 'ultimate one'. However it is not as pleasing as the symmetrical one since it has more cubes removed from the pieces and has a much looser feel to it.

For the design competition entry a mitered construction was used. The joints were strengthened by keys inserted at the corners. The unit used for the exchange puzzle was roughly 3/4 inch, leading to a larger puzzle, which presents better - but it turns out is a bit harder to play with due to the size.

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Paper Bag

Puzzle Goal: **Find the two secret compartments.**

Materials: Cherry tree, walnut

Classification: Take-apart

Notes:

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31 Pencil Case

Puzzle Goal: **Place four pencils flat in frame.**

Materials: MDF board

Classification: Put-together

Notes: Both sides of frame are puzzle stages.

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32 PentaMagiCube

Puzzle Goal: **Manipulate the cube so that it represents a packing of 11 different cubic pentominoes (and one unit cube) on the surface of a 4x4 cube. Each "pentacube" should be one homogenous color; two pentacubes of the same color should not touch on a "face".**

Materials: Plastic

Classification: 3D Sequential Movement

Notes: For a graduated challenge:

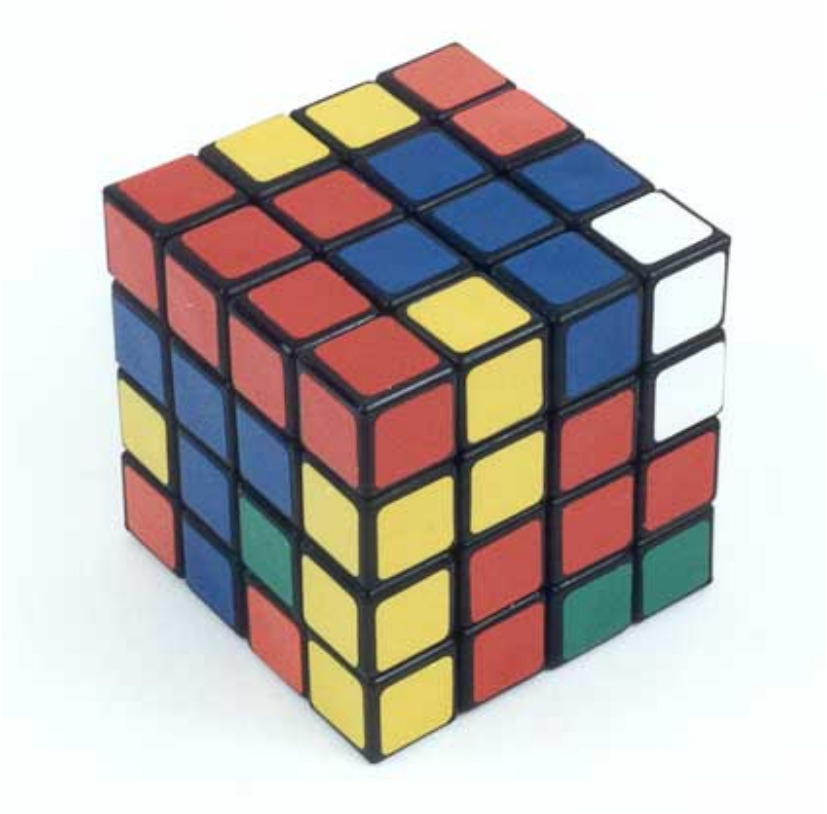
Level 1: A picture of solution 4 will be given and the solver is challenged to construct it.

Level 2: The solver is challenged to construct a solution where all colors are visible on some face (solutions 6, 7, or 8).

Level 3: The solver is challenged to construct a solution where no two pentominoes of the same color touch, even at a corner or edge (solutions 1 or 3).

Level 4: The solver is challenged to find all 8 solutions.

It is not known what the minimum sequence of moves is for getting any solution.



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33 Pythagorean Pentominoes

Puzzle Goal: **There are three frames, and three sets of pieces. The goal is to fit each set into a frame of a different color from the set of pieces. Specifically:**

Place the "square" (black) pieces into the Pythagoras and rectangle frames

Place the assorted (white) pieces into the oval and Pythagoras frames

Place the Pentomino (purple) pieces into all three frames

Materials: Acrylic

Classification: Put-together; 2D assembly

Notes: The sets of pieces cover three different facets of polygonal dissection:

- Traditional sets, such as the Tangram set, were composed of simple geometric figures such as squares and triangles.
- Many dissection problems in the early 20th century, as discovered by Dudeney, Loyd, and others, used these basic shapes as a starting point and added cuts to make the dissections workable. The "squares" set is such a set.
- In the early 20th century, Golomb and others started exploring the possibilities of combining these basic shapes together in a mathematically complete way, leading to the discovery of the polyominoes and other sets. The idea was to make as many shapes as possible with the same set. The Pentominoes set is based on such a set.
- Also in the early 20th century, the works of Lindgren, Frederickson, and others, were based on the desire to make the dissection workable in as few pieces as possible. Many interesting techniques were invented, often creating sets that did not have simple geometric figures as the individual pieces. The "assorted shapes" set is such a set.

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34

Q-Cube Project

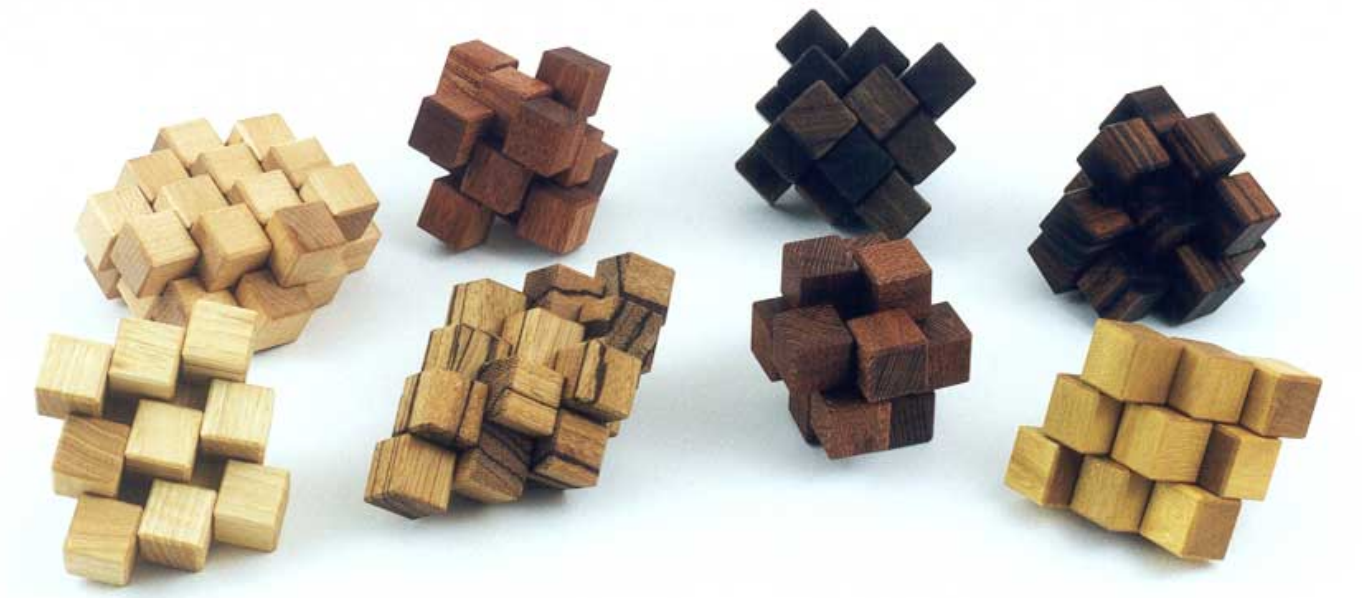
Puzzle Goal: **Disassemble and reassemble each of the eight puzzles.**

Materials: The chest is made of Brazillian Canarywood. Each puzzle is made in a different wood: Beefwood, Maple, Satinwood, Mahogany, Rosewood, Zebrawood, Pecan and Walnut.

Classification: Interlocking geometric objects

Notes: These puzzles might be considered hybrids of unrelated existing designs. We expect the relationship to be surprising yet obvious once it's pointed out. We were able to develop a single underlying mathematics that define this genre and we believe this work to be completely original. The puzzles are new in all respects and are based on our mathematical model, not on any existing design.

The goal of the Q-Cube project is to codify the underlying principles to puzzles constructed with offset cubies and to use the information to construct a series of 3 and 4 piece interlocking sequential assembly puzzles that are challenging. As collateral material, we also developed solver and analysis software as well as a technique for making high quality 3D images of the abstract data. The design process is published in the Q-Cube booklet. The source code for the software, data files, additional new designs and analyses are available for download from the Q-Cube webpage after the competition.



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35

Quartet

Puzzle Goal: **Find the four secret compartments.**

Materials: Cherry tree, walnut, etc.

Classification: Take-apart

Notes:

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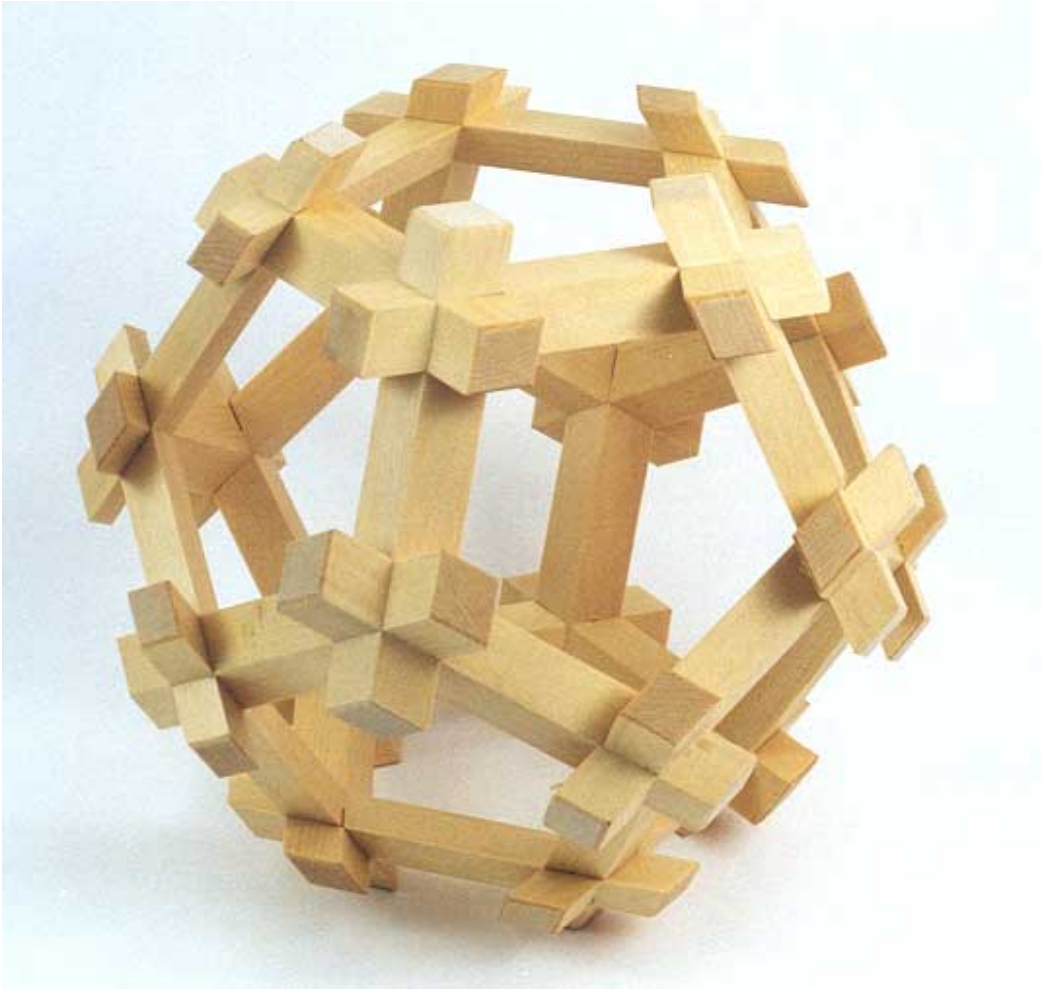
36 Regular Dodecahedron

Puzzle Goal: **Disassemble and reassemble the figure.**

Materials: Hiba

Classification: Interlocking Kumiki figure

Notes:



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37

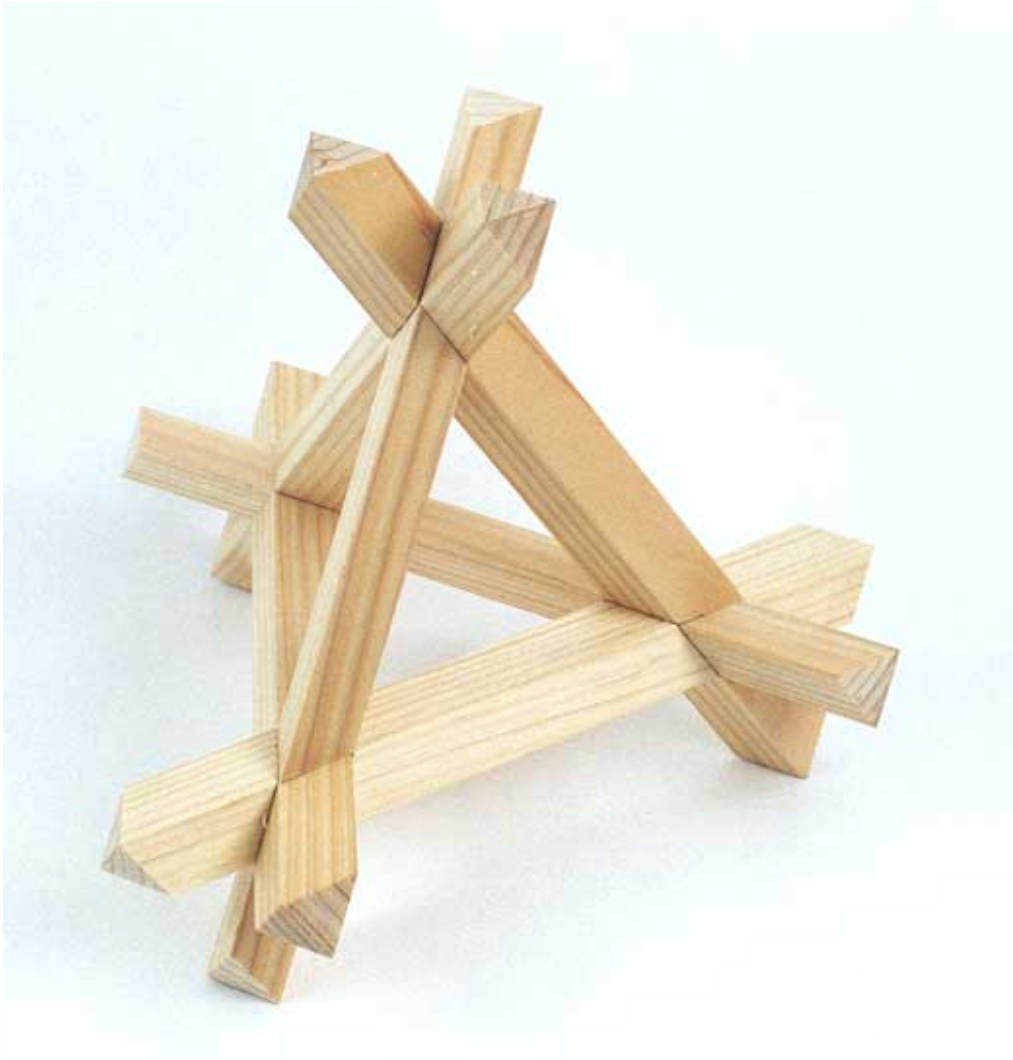
Regular Tetrahedron

Puzzle Goal: **Disassemble and reassemble the figure.**

Materials: Hinoki

Classification: Interlocking Kumiki figure

Notes:



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38 Repeating Box

Puzzle Goal: **Find the secret compartment.**

Materials: Maple, Walnut, Cherry, Bloodwood

Classification: Take-apart

Notes: There are two concepts that went into designing this box. One was the desire to create a box with pieces that had to be moved several times in different directions in order to increase the difficulty. This made the number of moves greater and also increased the difficulty in finding the next move. The other concept used was: the solution should not be something that you come to by chance, or by simply looking for the next piece that moves. Using this strategy the solver will begin to repeat the same sequence of moves. The mechanism was created to force the solver to understand how the internal parts work together.

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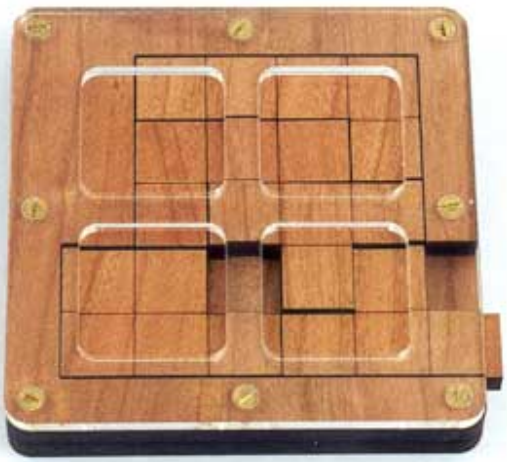
39 The Restricted Zone

Puzzle Goal: **Fit the five pieces into covered tray.**

Materials: Cherry box and pieces, Acryllic cover, Brass screws

Classification: Put-together

Notes: The idea for Restricted Zone occurred to me while designing an earlier restricted box-packing puzzle called Claustrophobia which relies on a different principle to get the pieces into the box. However, at that time, I could not find an appropriate implementation for it. The idea in Restricted Zone is to have a restricted box-packing puzzle with several apparent solutions for packing the pieces, but only one which is physically possible to pack due to the restriction. Moreover, back-and-forth sliding movements as well as twist moves are required to get the pieces into place much like high-level burr puzzles. Restricted Zone was the simplest design that I could find by hand.



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40

Ring Bottle

Puzzle Goal: **Try to get out the ring**

Materials: Mixed media

Classification: Take-apart; dexterity

Notes:

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41

Secret Heart

Puzzle Goal: **Open the secret compartment.**

Materials: Walnut, dogwood

Classification: Take-apart

Notes:

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42 Side-by-Side

Puzzle Goal: **Challenge: Place the 4 "Side-by-Siders" to make a cube with ONE color per side, and ONE color on top; ignore the cube's bottom.**

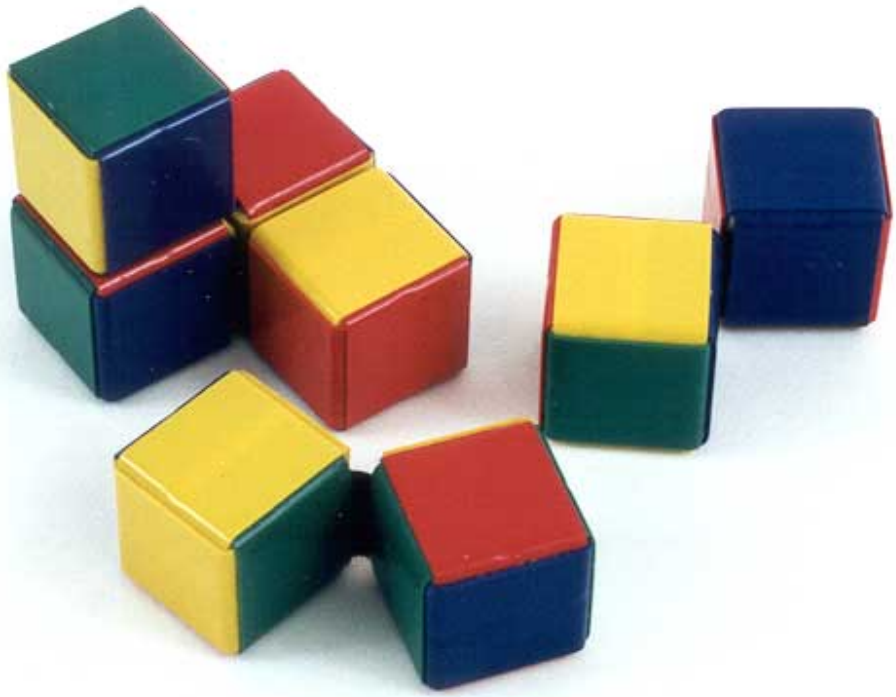
Bonus: Place the 4 "Side-by-Siders" to make a cube with FOUR colors per side and FOUR colors on top; ignore the cube's bottom

Materials: 8 Small wooden cubes, Several inches (centimeters) of 4 colors of electrical tape, and 4 short cloth bands for the hinges.

Classification: Put-together

Notes: Different collective group arrangements = 4,282,368.

Known solutions for either problem = 1.



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43 Sunflower

Puzzle Goal: **Separate the two parts**

Materials: Colored plastic

Classification: Route finding

Notes: Due to their specially designed shapes, the yellow "flower" can move freely around the green "box" without getting separated. Some of the edges of the box are not rounded and refrain the flower from hopping over. Also the holes in the box faces are specially shaped to restrict the rotation of the flower.

The puzzle is essentially a maze with many loops and no dead ends to maximize the confusion of the solver. Most loops have neutral effect, i.e. after going through them once or twice, you are back to where you started.

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44 Super-CUBI

Puzzle Goal: **Open the secret compartment.**

Materials: Cherry tree, walnut, etc.

Classification: Take-apart

Notes: This box is developed after CUBI, the binary system box made by Mr. Kamei. You can open it with 324 moves. But, you need 324 moves to close it again. It's the record for move moves for a sliding panel box.

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Thimble Bottle

Puzzle Goal: **Try to get out the thimble**

Materials: Mixed media

Classification: Take-apart; dexterity

Notes:

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46 Three Piece NOT

Puzzle Goal: **The puzzle is a three piece burr; the goal is to take it apart and reassemble it.**

Materials: Bocote, Curu, and Bubinga

Classification: Burr

Notes: So you think this is the Three Piece Knot? Well, it's not. It's actually the Three Piece NOT. Unlike the Three Piece Knot, this puzzle requires no less than eight moves to get the first piece out, and an additional four for the second piece. Impossible? Just try it!

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47 Too Much Drink

Puzzle Goal: **Using all 8 cubes form a bigger cube which will show a completed picture on each of its 6 sides (at the same time. Same picture on all 6 sides).**

Materials: **Classification**: Put-Together

Notes: This puzzle is based on the idea of the traditional picture block puzzle for children.

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48 Trinity

Puzzle Goal: **Disassemble and reassemble the six pieces.**

Materials: Rosewood and "Tiger" Maple

Classification: Interlocking burr

Notes: A patent for the Trinity puzzle and its method of assembly (U.S. Patent Office #6,203,015) was awarded to the designer on March 20, 2001.

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49 Tri-Square Enigma

Puzzle Goal: **Set all 6 pieces flat in the given tray.**

Materials: Maple, Rimu, Zebrano, Walnut, Rosewood, Masur (Baltic) Birch

Classification: 2D Assembly

Notes: The 6 pieces are built up from various combinations of 4 or 5 squares and equilateral triangles, all with sides of 1 unit length. The pieces are made to fit within a dodecagon whose sides alternate between 1 and 2 units in length. The pieces do not fill the tray. In fact, the unused area is enough to hold more than 9 extra triangles!

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Turbine Cube

Puzzle Goal: **Turbine Cube is a cube dissection of eight identically fan-shaped pieces. Variations in coloring allow the cube to be reassembled in a variety of patterns. The most relevant are:**

1: Squares of same colors together. (+ mirror) Each side of cube is a solid color forming three pairs of sides.

2: Squares of same color separated. (one solution) Each face has all three of the colors with no square touching its own color even around edges of cube.

Materials: Wood

Classification: Cube dissection

Notes:

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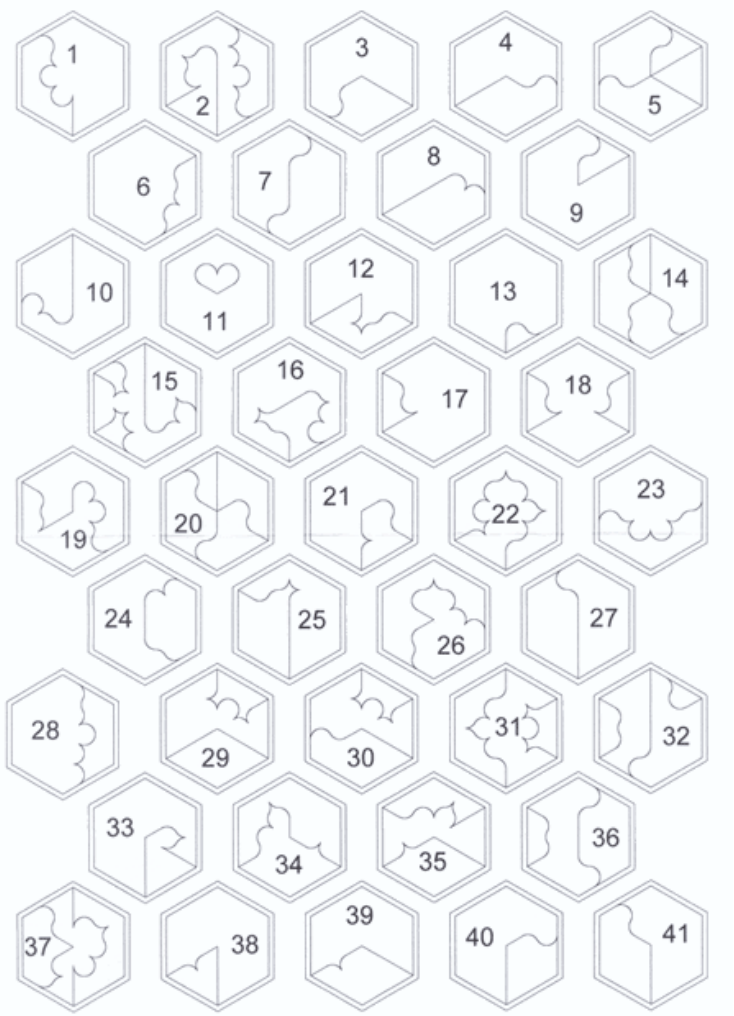
51 Valentine Puzzle

Puzzle Goal: **There are various levels of playing this puzzle:**
A) Fit all the pieces back in to the tray (ignore the colors).
B) How many solutions can you find with just one color.
C) Find a solution that fills half of the tray in one color and half in the other.
D) Find the solutions to the patterns (see below).
E) Find a solution with the heart in a corner of the tray.
F) Find a solution for each piece that leaves just that one piece white and everything else red.
G) Find a solution with a white triangle and everything else red.
H) Find solutions that are symmetrical to a line.
I) Find a solution that is point symmetrical to the center.
J) Find a solution with pieces 5 and 6 NOT touching each other.
K) Find out how many patterns there are possible.
L) Find out how many solutions there exist.
M) Find more tasks.

Materials: Birch plywood

Classification: Put-together, 2D assembly, jigsaw

Notes:



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Walk of Ladybug

Puzzle Goal: **Open the secret compartment.**

Materials: Japanese oak, rosewood, etc.

Classification: Take-apart

Notes:

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Wun-Wa-Sure

Puzzle Goal: **Remove the nuts from the bolt.**

Materials: 3/4 inch 360 hex bar stock

Classification: Take-apart

Notes:

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54 YOSEGI Puzzle

Puzzle Goal: **This is the original form of wood mosaic.**

Materials: Japanese sen, makoure

Classification: Put-together

Notes:

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